

## OIF UNI 1.0 - Controlling Optical Networks

### Introduction

Telecommunications service providers have embraced Dense Wavelength Division Multiplexing (DWDM) as the most cost-effective technology for increasing the capacity of optical fiber networks. This new optical network layer now promises intelligent transport services that will allow clients such as IP routers and ATM switches to interconnect, initially using SONET/SDH network interfaces, but followed by other optical interfaces over time.

As bandwidth requirements increase by orders of magnitude, the most pressing issue is how to manage and control large optical networks. Currently, optical networks are provisioned through supplier-specific element management systems (EMS). Provisioning end-to-end connections across equipment from different manufacturers has involved the use of multiple incompatible EMSs, leading to long provisioning times in an era when customers are demanding shorter provisioning times. To address this critical issue, MPLS-based control intelligence is being adopted for use within optical networks to shorten provisioning times. At the same time, a standard signaling interface between client and optical networks has been defined by the OIF to enable dynamic provisioning requests.

### OIF UNI 1.0

The OIF UNI 1.0 enables clients to establish optical connections dynamically using signaling procedures compatible with Generalized MPLS (GMPLS) signaling, as shown in Figure 1. This, along with intelligence within the optical network, will allow provisioning to occur within seconds rather than days or weeks.

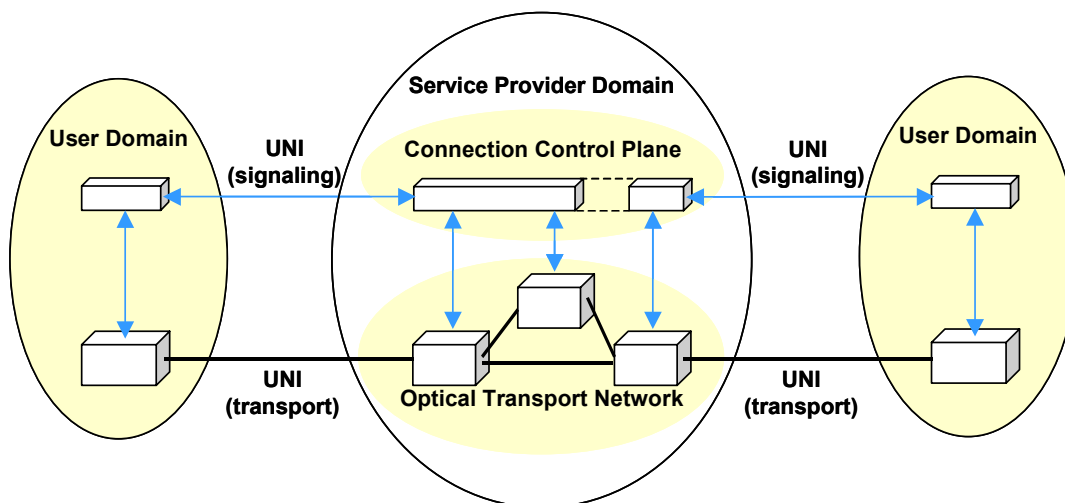


Figure 1. UNI used between service provider and user domains.

In addition to signaling, the UNI specification includes two other aspects to simplify management of these complex networks. The first is a neighbor discovery mechanism that

will permit equipment on both ends of a fiber link to identify each other. Neighbor discovery will allow management systems to build interconnection maps automatically, reducing the cost of manually building such databases and minimizing the errors that creep into manual databases. The second important aspect of the UNI is a service discovery mechanism that will enable clients to determine the services that are available from the optical network. Service discovery will allow clients to automatically discover and take advantage of new optical network services as they are introduced over time.

### UNI Applications

The OIF UNI 1.0 is likely to revolutionize optical networks by enabling new innovative applications. It will allow clients to bypass the lengthy manual provisioning process by using signaling procedures to establish connections across multi-vendor networks. This not only shortens the provisioning interval, but also reduces the carriers' operations costs.

Traffic engineering is especially difficult in today's environment with rapidly increasing bandwidth requirements for data. Capacities must be planned well in advance in order to be available when needed, and excess capacities are wasted because of the static nature of today's transport networks. The OIF UNI 1.0 will solve this problem by enabling dynamic traffic engineering in which routers, for example, could establish additional connections based on monitored traffic levels. This is shown in Figure 2, where connections are established when traffic levels are high, and released when the traffic declines.

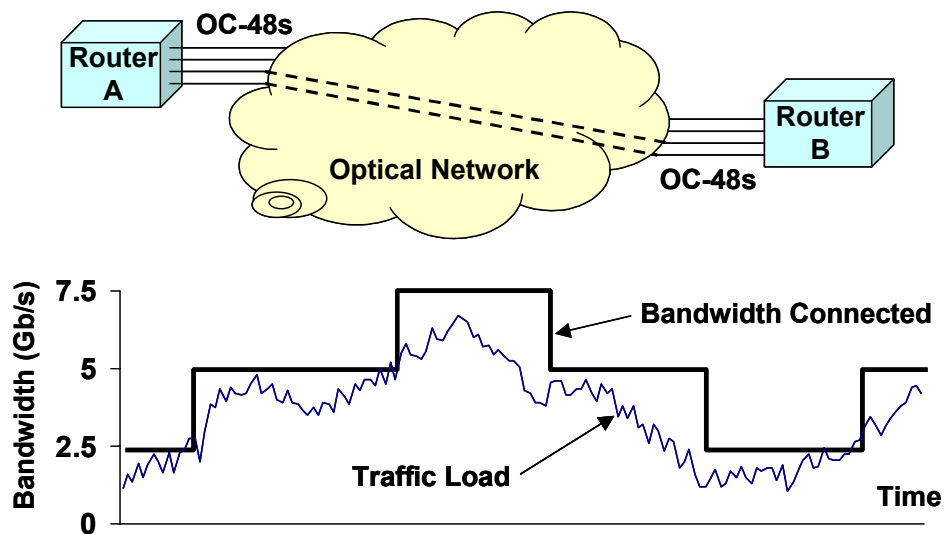


Figure 2. Illustration of UNI signaling used to establish bandwidth between routers.

## **UNI Status**

The OIF approved the UNI 1.0 specification in December, 2001. An interoperability demonstration of 25 different vendors illustrating a significant subset of the UNI 1.0 capabilities was showcased in June 2001 at SUPERCOMM.

The OIF is presently considering enhancements to UNI 1.0 ("UNI 2.0").

*Author(s):*     *Greg Bernstein*  
*Senior Scientist*  
*CIENA Corp.*  
[greg@ciena.com](mailto:greg@ciena.com)  
408-366-4713

*Bala Rajagopalan*  
*Principal Architect*  
*Tellium, Inc.*  
[braja@tellium.com](mailto:braja@tellium.com)  
732-923-4237

*Dan Spears*  
*Director*  
*CIENA Corp.*  
[dspears@ciena.com](mailto:dspears@ciena.com)  
410-865-4902